



Take action on climate change.
It's easy to make a difference.

Make small changes at
home and school.

Reduce emissions - use
your own energy!



Remember - we're in this together,
so help your friends take action too!



Conservation Corps
NEWFOUNDLAND & LABRADOR



GOVERNMENT OF
NEWFOUNDLAND
AND LABRADOR

Department of
Environment and Conservation

climatechange
education centre
A project of Conservation Corps
Newfoundland and Labrador

For more activities and information on climate change and
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Climate Change: A Local Focus on a Global Issue

Student Workbook



Climate Change: A Local Focus on a Global Issue



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Congratulations on deciding to learn about climate change! Learning about it and how it will affect your community is the first step in doing your part to reduce the effects of climate change. Throughout this booklet you will be seeing the four members of the Climate Change Club, and each member will tell you about their concerns. Have fun and remember that we have to be good to the Earth, because good planets are hard to find!



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Climate Change



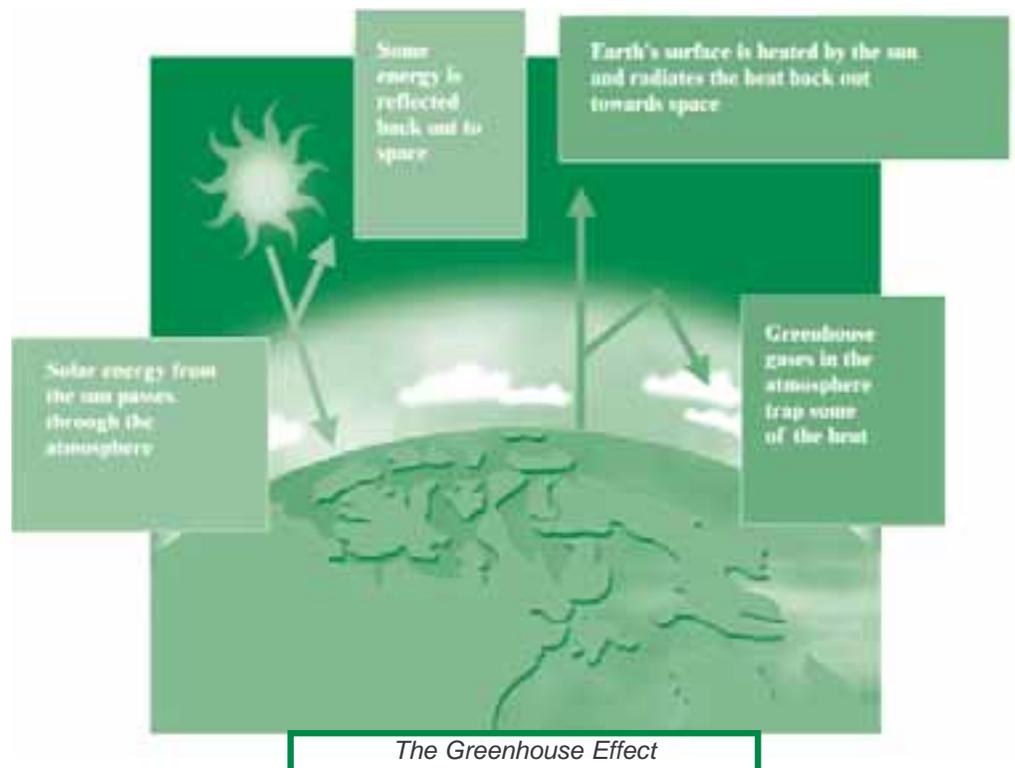
*My climate is changing
and I need your help!*

Our Climate is Changing...

The climate is always changing. For example, 10,000 years ago Newfoundland and Labrador was covered with huge sheets of ice. Parts of the Grand Banks were actually above sea level because sea level was lower than it is now. Then temperature got higher, the glaciers melted and the sea level rose. The climate changed. So if the climate has always changed, why are we worried about it? We're concerned because it's happening faster than ever before and at such a rapid rate of change, not all plants and animals will be able to adapt.

Since the Industrial Revolution (about 200 years ago), people have been pumping greenhouse gases into the atmosphere. Newly built factories used coal, a fossil fuel, that when burned releases carbon dioxide, a greenhouse gas. Fossil fuels are the remains of plant and animal life that create energy when burned. Coal, petroleum (oil) and natural gas are all fossil fuels.

The burning of fossil fuels creates carbon dioxide that enters our atmosphere. Carbon dioxide is a greenhouse gas. Greenhouse gases are present naturally in our atmosphere, and trap heat on our planet. Without the greenhouse effect, the Earth would be too cold to support life. A stronger greenhouse effect would make the Earth warmer and cause problems for plants and animals.



The Greenhouse Effect

gases to the atmosphere including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and water vapour. The one we produce the most of is CO₂. While CO₂ is not as powerful a greenhouse gas as these others, we produce so much of it that it is the biggest problem.

What's wrong with a warmer climate?

What's wrong with climate change? Many people believe that warmer temperatures can't be that bad. They can be. A warmer global climate means more than not having to wear a winter coat in January, it could also have long-term impacts on our lives here on Earth, in the following ways:

- More people will suffer from asthma and allergies because of increased air pollution
- Rising sea levels due to warmer water and melting polar ice caps
- More extreme weather events like powerful hurricanes and heavier rainfalls
- Entire ecosystems will change with some species dying out and new ones moving in. The polar bear is one example of a species which will disappear from some areas of the planet.



Warmer temperatures spell trouble for the polar bear.

A closer look

Some of the effects of climate change will be more apparent in Newfoundland and Labrador. Let's take a closer look at some of them.

Sea level rise

Ocean levels are projected to rise by as much as 80cm in the next 100 years. The level of rise depends on the amount the temperature rises. Warmer water takes up more space than cooler water. That means that as our oceans get warmer, they'll need more space with the result being higher sea levels. Added to this higher ocean will be water from melting glaciers and polar ice caps.

Here in Atlantic Canada, we have another reason to be worried about higher seas. We're sinking! For the last 1000 years, the earth's crust under Atlantic Canada (with the exception of Labrador) has been sinking. Unfortunately for us the projected sea level rise due to climate change will be added to what is already happening.

So, how vulnerable is my community to a rising sea? Much of our coast is exposed to a degree. Areas that will see the most effects are commonly low-lying with salt marshes, barrier beaches, or lagoons. Common effects of a rising ocean include increased coastal erosion, rapid migration of beaches, and flooding of coastal freshwater marshes. Areas of the province that are most at risk include areas of the Burin Peninsula, areas on the west coast (including Stephenville) and the town of Placentia.

Coastal erosion

Erosion along the coasts is becoming more of a problem. Traditionally sea ice has protected our shores from winter storm waves. Less sea ice due to higher temperatures means less protection for those areas. Coastal bluffs in Atlantic Canada are retreating, sometimes at a rate of 12 m in a single year. We have to make the decision to either protect vulnerable structures by investing in coastal defenses or to abandon them altogether.



The high tide level has risen at the Fortress of Louisberg in Nova Scotia. Sea levels are rising. Photo credit: Environment Canada

Storms

Increased storm activity and strength will certainly have an effect on this province. Rainfall levels that used to only happen every hundred years or so will now happen more frequently. Areas of the province that generally only see flooding once every 50 years could now see it every 20 years. Increased storm intensity also brings higher storm surges. Storm surge damage has been seen in recent years all along our coasts.

Below: Coastal Erosion at Cape Verde.
Photo Credit: David Liverman



Above: A storm surge on May 16, 2005 affected 9 communities along the east coast. The breakwater in the town of Flatrock on the Avalon Peninsula was almost completely destroyed. Photo credit: David Liverman

Climate Change Activities

Tides of Change

Grade Level 4-12

Answer the following questions using *The Tides of Change: Climate Change in Atlantic Canada* poster.

Part 1 - Causes of Climate Change

1. Although Canada has only 0.5% of the world's population, it produces 2% of this.
_____.
2. The "big three" greenhouse gases are _____, _____, and _____.
3. CO₂ has the greatest influence because _____.
4. Three types of fossil fuels are _____, _____, and _____.
5. What are fossil fuels used for? _____.
6. What does burning fossil fuels do? _____.
7. _____ is an activity responsible for 26% of greenhouse gas emissions in Canada.
8. Looking at the Annual Greenhouse Gas Emissions per capita data, each Canadian emits _____ tonnes of carbon dioxide (CO₂) per year.
9. In Atlantic Canada, the four areas that contribute most to greenhouse gas emissions are _____, _____, _____, and _____.

Part 2 - Consequences of Climate Change

1. All species in the marine food web are affected by _____.
2. What is happening to most of the world's glaciers? _____.
3. According to the Temperature Change maps, what areas show the greatest temperature changes?

4. How could hydro-electricity be affected by climate change?

5. Why might the gypsy moth threaten Canadian forests if warming continues?

6. Why may storm surges cause more frequent and severe flooding?

7. The greatest concern for agriculture in Atlantic Canada is _____.
8. How would more storms, hail, floods and droughts affect farms?

Tides of Change - *continued*

9. Make a list of positive and negative consequences for farmers if global warming continues.

Positive

Negative

10. What specific types of coastal areas will be most affected by sea level rise?

11. What will happen to sea ice with global climate change?

12. What benefits and concerns would there be with less sea ice?

13. How will climate change affect vegetation zones?

14. How will wildlife populations handle a changing ecosystem or habitat?

Part 3 – Action on Climate Change

1. What percent does Canada aim to reduce its emissions by under the Kyoto Protocol? _____

2. What is the fastest, cheapest and surest way to reduce greenhouse gas emissions?

3. When we save energy or replace fossil fuels, we help to

4. These are four low-emission ways to travel. _____,

_____, _____, and _____

5. Five types of energy that would reduce greenhouse gas emissions are _____,

_____, _____, _____, and _____.

What do you *already* do to save energy?

What else *will* you do to save energy?

What's Your Ecological Footprint?

Grade Level 4-12

The way we choose to live impacts the Earth. Our habits leave a mark, like a footprint. This quiz will give you an idea of how much space your footprint takes. You'll probably be surprised!

Please circle the answer that best describes you. When you're finished, your teacher will go over the answers and scoring.

Section 1 – Housing

1. How many people live in your house?
a. 1 b. 2 c. 3 d. 4 e. 5 or more
2. How is your house heated?
a. Natural gas b. Electricity c. Oil d. Renewable (solar, wind)
3. How many toilets and individual faucets (taps in your kitchen, bathrooms, laundry room, and outside) do you have in your house?
a. Less than 3 b. 3 – 5 c. 6 – 8 d. 8 – 10 e. More than 10
4. What type of home do you live in?
a. Apartment/Condominium b. House

Section 2 – Food

1. How many times a week do you eat meat or fish?
a. 0 b. 1 – 3 c. 4 – 6 d. 7 – 10 e. More than 10
2. How many homemade meals do you eat per week (including those you bring to school or work)?
a. Less than 10 b. 10 – 14 c. 15 – 18 d. More than 18
3. When purchasing your food items, does your family try to buy locally produced goods?
a. Always b. Sometimes c. Rarely d. Never e. Don't know

Section 3 – Transportation

1. If you or your family own/use a car, what type of car is it?
a. Motorcycle b. Small compact c. Full-sized
d. Sport utility vehicle or mini van e. Pick up truck or full sized van
2. How do you get to school?
a. Car b. Public Bus (not school bus) c. School bus
d. Walk e. Bicycle or rollerblade

3. How many trips do you make a week on public transit that you would have otherwise used a car?
a. 0 b. 1 – 5 c. 6 – 10 d. 11 – 15 e. More than 15
4. Where did you go on vacation within the last year?
a. No vacation b. Within the province c. United States
d. Outside the province, but within Canada e. Outside Canada and the U.S.
5. How many weekend trips do you take by car, ATV or snowmobile (e.g. to the cabin, or camping?)
a. 0 b. 1 – 3 c. 4 – 6 d. 7 – 9 e. More than 9

Section 4 – Purchases

1. How many large purchases (stereo, TV, computer, furniture, fridge, stove, other) has your family made in the last year?
a. 0 b. 1 – 3 c. 4 – 6 d. More than 6
2. Has your family bought any energy efficient products in the past year (light bulbs, fridges, stoves, furnaces)?
a. Yes b. No

Section 5 – Waste

1. Does your family try to reduce the amount of waste generated in the house (buying food in bulk, refusing junk mail/flyers, using reusable containers for storage, other?)
a. Always b. Sometimes c. Rarely d. Never
2. Does your family compost?
a. Always b. Sometimes c. Rarely d. Never
3. Does your family recycle newspapers, cardboard/pizza boxes, paper, aluminum cans, glass/plastic bottles and other materials?
a. Always b. Sometimes c. Rarely d. Never
4. How many garbage bags of waste do you leave at the curb each week for pick up?
a. 0 b. 1 half full garbage bag c. 1 d. 2 e. More than 2

My Ecological Footprint is: _____

*Ecological Footprint Quiz courtesy of the Recycling Council of Ontario.
Used with permission.*

Making Connections

Grade Level 9 -12

What is the relationship between electricity, water, oil, other resources and greenhouse gases? That's what you will find out by doing this activity. By the end, you will understand the importance of becoming a responsible consumer of energy to reduce the impacts of global climate change.

Your teacher will have stations set up. Answer the following questions using those stations.

1. By taking responsibility by planting trees in your yard and your community, how will you curb the threat to global climate change? *List at least two ways.*

- a. _____
- b. _____

2. By installing this device, how might you help curb the threat to global climate change? *List at least three ways.*

- a. _____
- b. _____
- c. _____

3. This compact fluorescent light runs on a fraction of the electricity that it takes to run the typical incandescent light bulb. With your use of these compact fluorescent lights in your home, how might you be taking a step towards curbing the threat to global climate change? *List at least two ways.*

- a. _____
- b. _____

4. How do your efforts to recycle help curb the threat of global climate change? *List at least two ways.*

- a. _____
- b. _____

5. How does the continual use of reusable lunch/shopping bags help curb the threat of global climate change? *List at least two ways.*

- a. _____
- b. _____

6. Paper or plastic or...? Keeping in mind what you have learned about global climate change, what do you think is ultimately the best response to give the store clerk?

7. How might your keeping the car tuned regularly be a responsible step towards curbing the threat to global climate change? *List at least two ways.*

- a. _____
- b. _____

8. How might your reduction in consumption of beef be a responsible step in helping to curb the threat to global climate change? *List at least four ways.*

- a. _____
- b. _____
- c. _____
- d. _____

9. Love veggies? So do I... The veggies in the left bowl were grown locally. However, the ones in the right bowl were not and can be purchased in our stores seasonally. Which vegetables should you buy to help curb the threat to global climate change? *List at least two reasons.*

- a. _____
- b. _____

10. How might remembering to always turn the lights off when leaving a room be a step towards curbing global climate change? *List at least two ways.*

- a. _____
- b. _____

We each have to do our part to reduce our greenhouse gas emissions and slow the changes in our climate. Plants and animals, like the polar bear, are counting on us.



Photo credit: Parks Canada, W. Lynch.

Conservation Nation



Let's all do our part to use resources sustainably.

If you want to change the world, start in your home and your school, the two places you spend most of your time. Now you may be thinking that you recycle at school and recycle and compost at home, so you're already doing your part. And waste management is a good thing to do, but there are other things you can be doing at home that would have a bigger impact.

A closer look: Water

Water is one of the most important substances on Earth. We drink it, and wash our dishes, clothes, cars and selves in it. Food won't grow without it. You can live without food for about 1 month, but for only 5-7 days without water.



Less than 1% of the water in the world is available for us to use and we are using more and more of it everyday. Would it surprise you to know that over 2 billion people in the world have no access to clean drinking water and that over 4 billion people do not have running water at home? In some parts of Africa, women and children carry up to 20 litres of water, often for over 5 hours, from their nearest water supplies. The average urban home in industrialized nations uses 640 litres of water per day.

Photo Credit: Department of Environment & Conservation - Paul Neary - 2004

If we don't start taking water and management conservation seriously, we could be facing a global crisis. We're looking at more people wanting to use more water.

And we're destroying some of the water that we have. The developed world regularly pollutes water supplies, rivers and seas. And water quality is as important as water quantity. We could have all the water in the world, but it wouldn't do us any good if it were polluted. Recently, more than 43 different pesticides were found to be at illegally high levels in the United Kingdom's drinking water.

So what can you do to help? For starters you can take water conservation seriously. It just isn't the problem of the billions of people who have access to limited water supplies, it's everyone's problem.

So what can I do?

1. *Have a shower, not a bath.* On average, a bath uses twice as much water as a shower.
2. *Run the water only when you need it.* Use a sink of water for washing and rinsing dishes instead of letting it run.
3. *Wash clothes less often.* Sometimes clothes are not really dirty, they just need airing or freshening up. Your clothes will last longer too.
4. *Get a low flow showerhead* for all the bathrooms in your house.



Ducks use a lot of water when they take a bath. But that doesn't mean you should. Take a shower instead.

A closer look: Home Energy

Renewable Energy: Energy from a source we can't run out of. Wind, solar and hydro are all renewable energy sources.

Non-renewable Energy: Energy from a source we can run out of. Oil, natural gas and coal are all non-renewable energy sources. When we run out of them, they're gone.



A solar panel in northern Canada. Solar panels take light from the sun and turn it into energy. Photo credit: Parks Canada, W. Lynch.

Like water use, the use of energy is growing. Global energy use has risen by almost 70% during the last 30 years. And it's predicted to increase by 2% every year for the next 15 years.

The amount of oil consumed worldwide in a single year took nature a million years to create. It is estimated that oil reserves could run out in 60 years. Our traditional energy sources – coal and oil – are fossil fuels. They get their names from the fact that they were formed over millions of years from the fossilized remains of dead animals and plants.

In Newfoundland and Labrador, much of our energy is provided through the burning of fossil fuels (such as diesel generators or the Holyrood generating station) or hydroelectricity. Hydroelectricity is a low emissions source of energy, but burning fossil fuels is not.

There are alternatives to burning fossil fuels for energy. Newfoundland and Labrador Hydro is currently looking at some forms of alternative energy to supplement their existing energy sources. One they are currently investigating is wind power. There is currently an experimental wind-generating site at Ramea on the south coast and Newfoundland and Labrador Hydro plans to be generating some wind power by 2008. However, they say that due to limitations for the technology, wind power cannot replace Holyrood.

Individual homeowners living in remote areas are experimenting with alternative energy sources in their bid to stay off the “grid”. This means that they produce enough power on their own and do not have to use power supplied by Newfoundland and Labrador Hydro. Some people are constructing windmills to harness the wind. Others are installing solar panels to make use of the cleanest energy source we have...the sun.

So what can I do?

It's not feasible to expect people to convert their homes to solar or wind power. Both of those options remain quite expensive for an individual to do. What you can do is reduce the amount of energy used at home. It's good for the environment and for the pocketbook.

1. *Switch from regular light bulbs to CFLs.* A CFL is a Compact Fluorescent Light bulb. They use up to 85% less energy than a regular bulb and last up to 10 times longer. And of course you should switch off lights in empty rooms.

2. *Turn it off!* A TV set on standby can still use 25% of the energy it uses when it's on.

3. *Turn down the thermostat.* Turning it down just a few degrees saves energy and money. If you're cold put on another layer of clothes.

4. *Replace appliances with energy efficient ones,* or encourage other people to do that. Next time your family buys a new appliance, look for the EnergyStar rating.

5. *Get an energy evaluation on your home and retrofit your house.* You'll save energy, money and the environment. Look for an EnerGuide provider in your area.

Conservation Activities

Pay Me Game

Grade Level: 6 - 8

What's the real cost of your energy habits? Find out by playing the Pay Me Game!

Choices have consequences. When we choose to buy a product or use resources, we have to keep the true cost in mind. There are choices that we can make that can limit our ability to do or buy things that we want. Other choices will increase the amount of money that you have for the things you really want. Our wants can only come after our needs. In this activity you will look at how choices regarding needs limit getting the things you want. If you want money to spend on yourself, you must make smarter choices regarding your needs.

Instructions:

1. You will be given 2 envelopes and \$100 in play money: 20 \$1s, 10 \$5s and 3 \$10s.
2. Mark one envelope "ME" and the other "UTILITY".
3. Listen to the instructions from your teacher. Depending on your answers, you will put money into the "me" envelope or the "utility" envelope. If you run out of money before the end of the game, you may borrow from your "me" envelope.
4. At the end of the game, count the money in each of your envelopes. This shows you what your energy habits are costing you.

How could you get more money into your "me" envelope?

School Energy Survey

Grade Level: 7 - 12

Become an energy detective!

In this activity, you will investigate the management of the energy consumed in your school. Some things you will do in your investigation include measuring and monitoring the temperature and light intensity levels in classrooms, hallways, and other rooms; the temperature of the hot water in different areas of the school, and other controls, management, and behaviours that affect energy consumption.

Your teacher will introduce the activity to you and demonstrate how to use the instruments that you will be using to complete your investigation. Using a blueprint of the school, number the common areas and non-class rooms of the school as a class.

You will be part of an investigative team.

The class will be divided into teams. Each team will be assigned parts of the school to investigate. Each team will have 10-15 minutes to collect the data on the recording form.

1. What are some different methods for analyzing the data collected? For example, comparing rooms on the south side with rooms on the north side, or comparing rooms with lots of windows to rooms with few or no windows.

2. Analyze the results using the methods you have devised. What have you noticed?

3. What are 5 ways to conserve energy?

The Case of the Mysterious Renters

Grade Level: 4 - 6

It's your job to solve the case of the Mysterious Renters.

1. Read the story *The Case of the Mysterious Renters* and complete the questions.
2. Your teacher will hand out a water survey for you and your family to fill in. Listen carefully to the directions on filling out the survey. A weekday, when your family has more of a routine, will provide the best picture of daily water use.

Brainstorming about Water Conservation

Answer these questions based on the results of your family's water use survey.

1. What could your family do to reduce the amount of water used?
2. How much water do you think your family could conserve?
3. If everyone in the class followed that practice, how much water would it save in a year?
4. Are there ways to conserve water that would not be a good idea?

Compare your list with the “*Water Conservation Tips*” handout. Look it over as a group to see how it compares with your list. Take it home and post it in the bathroom or kitchen as a reminder to conserve.

How much water does your family use?

Home Water Use Survey

Directions:

This water survey will measure how much water your family uses in one day. Place a tally mark in the Times/Day column every time someone in your family does the activity on the left.

		Times/Day	Total
Toilet Flushing	19 litres	x _____	= _____
Short Shower	95 litres	x _____	= _____
Tub Bath	135 litres	x _____	= _____
Teeth Brushing	8 litres	x _____	= _____
Washing Dishes with running water	115 litres	x _____	= _____
Washing Dishes by filling a basin	40 litres	x _____	= _____
Using Dishwasher	75 litres	x _____	= _____
		Grand Total	= _____

NOTE: Washing clothes in a washing machine is not included in these calculations—a typical wash cycle uses 40 litres of water. Another significant seasonal water use is lawn and garden watering. This survey deals with daily water use in the home, but most of us use additional amounts of water at school, at work, and other places throughout the day.

To find average use per person in your family, divide the grand total by the number of people in your family. The average use per person in your family is: _____

Follow-up questions:

1. In your home, which activity happened most often? _____
2. What other activities at home consume large amounts of water? _____



Save energy by using CFLs. If every Canadian household switched just one regular light bulb to a CFL, we'd save more than \$73 million in energy costs annually. It would save as much greenhouse gas emissions as taking 66,000 cars off the road for a year. That's tonnes of greenhouse gas savings!

Consumer Culture



Think before you buy!

The Consumer Culture

We live in a consumer culture. A culture where you're not "cool" unless you have the latest gadget, clothes, shoes, music...the list could go on forever. And this attitude is costly for our planet. The life of a product doesn't begin when you buy it and end when you throw it away. The life of that product began long before you picked it up in the store, and on its way to you and after you dispose of it, it uses some of the planet's resources. Looking at the life of a product from the beginning to the end, or *cradle to grave*, is part of the idea of sustainable consumption. That means that we should use resources responsibly so that there are some left for the future.

Did you know that not everyone in the world is as lucky as we are here in Canada? There are places in the world where people can't access clean water. There are places in the world where people can't shower everyday because there isn't enough water. There are places in the world where people don't watch television because they don't have electricity. There are places in the world where children don't go to school because they work. There are over 2 billion people in the world who need more just to survive. You can help by reducing the mark you make on the Earth and thinking before you buy.

The life of a notebook

One of your school notebooks has been through a lot already. Let's trace it's path so far:

1. A tree is cut down
2. The tree is thrown into a chipper at a paper mill, which chews it up into little pieces.
3. The wood chips are dumped into a digester and boiled in water and chemicals. This softens the wood into a slushy, sloppy pulp, which is bleached with more chemicals.
4. A mixture of one percent pulp and 99 percent water is sprayed onto a fast-moving mesh screen and is then flattened and dried by another machine. The water that drains out, contaminated with chemicals, is often dumped into nearby lakes or rivers.

5. Big rolls of dried paper—looking like oversized toilet paper rolls—are then put through another machine that cuts them into individual sheets for our use.
6. The paper then gets bundled up and shipped by truck, train or boat to warehouses and stores where it can be sold.
7. Enter you. You buy the notebook, use it, and throw it away.

As you can see, each of those steps in your notebook's history creates waste. And is that really the end of the story? Too often, old papers and magazines end up in the trash, making up 30 to 40 percent of our landfills. But you can change the end of this story.

So what can I do?

There are lots of things you can do to use fewer resources and produce less waste. The number one thing to do is think about the waste you will create *before* you act. Here are some helpful tips on conserving:

Practice the three R's and one C

These are the general rules of keeping waste out of our landfills: reduce, reuse, recycle and compost. Reduce the amount you use, reuse what you can and recycle or compost the rest. It's important to remember that while waste reduction is important, there are things you can do that have more of an impact on greenhouse gas emissions.

Buy recycled paper

Cut down on all those resources used to make that notebook.

Using recycled paper can not only save a tree, but all the resources and energy that went into making that tree into paper. And it reduces the amount of paper waste in the landfills.

Eat more meat-free meals

It takes a lot of land, water and resources to raise an animal, which causes many environmental problems. But, you don't have to become a vegetarian to make a difference. Eating a meat-free meal once a week conserves valuable water, energy and land. Also, eating more fruits and vegetables will improve your health.



*Composting reduces waste going to landfills.
And it makes great fertilizer for your garden.*

Buy more local products

Local products didn't have to travel as far to get to you. Less time in a truck means less greenhouse gas emissions. Buying local also supports the local economy.

Use reusable shopping bags

Regular grocery store plastic bags can take hundreds of years to break down in our landfills. Get some reusable cloth bags and use them instead.

Choose products that have less packaging

It seems obvious, but definitely worth pointing out. Less packaging means less energy and resources are needed to manufacture packaging and it means less waste going to our landfills.

Use reusable containers for coffee and water

A common sight on the side of the road are empty coffee cups. Use a reusable mug and you not only cut down on waste you might even get a discount at the coffee shop. And millions of plastic water bottles get thrown away everyday. Buy a reusable one and keep it until it wears out



Buy used or vintage clothing. It's cool, affordable and reduces waste!

Buy clothes from second hand stores

Vintage clothes are cool and cheaper than new stuff. Buying them keeps waste out of landfills and also means resources are saved because less new clothes have to be made.

Consumer Culture Activities

When the Chips are Down

Grade Level: 6 - 12

Canada has one of the largest ecological footprints in the world. In fact, only the United States uses more natural resources per capita than we do. Let's look at how our feet got so big.

1. In groups, design and draw a map of your 'ideal' country, including the following: farmland, housing, water, forests, recreation, energy sources, infrastructure, waste disposal, defense, and open space/wilderness. Decide on a name for your country and the type of government you want, and write these on the map.
2. Draw your country. First discuss what to include with your group. Draw your map as if you were looking down on it from an airplane flying above (e.g., small squares for houses, areas for food cultivation, roads, etc.). Be creative and think about everything you might want to include in your ideal country.
3. Briefly present your map to the class.
4. Follow your teacher's instructions on how to play the chip game. Remember that chips cannot be placed outside the borders of countries and cannot be placed on top of each other since an ecological footprint is the surface area of the earth, and therefore cannot be stacked.
5. What happened in your country?

Discussion Questions:

1. What two things can make a country's total ecological footprint bigger?
2. What different choices would you have made in your country if you had known what was going to happen?

Needs and Wants

Grade Level: 4 - 6

Needs and wants are not the same thing. By looking at the difference between a need and a want, you will make better decisions about things to buy.

What is the difference between a need and a want?

What is the price of making a lot of garbage in your classroom?

Read or watch *The Lorax* by Dr. Seuss.

Complete the worksheet given out by your teacher.

Student Worksheet: Needs and Wants

Write your own ending to the Lorax starting after the word UNLESS...

Unless...



It's important to make smart buying decisions. Buying products that use less resources to make and have less packaging shows companies that we think conserving our planet is important. It's cool to conserve, so think before you buy!

Fishing for the Future

Grade Level: 6 - 12

The fishery is an important part of Newfoundland culture. It was the reason people settled and stayed here. Unfortunately, like many fish stocks around the world, our cod stocks have dropped significantly. In this activity, you will simulate fishery activity in different oceans. Will the same thing happen in your ocean as happened here?

Sustainability: Meeting the needs of the present without limiting the ability of people, other species, and future generations to survive.

Why should sustainability be an important goal for a society and what might be difficult about realizing this goal?

You are going to go fishing and explore some sustainability issues. The game rules are:

1. You are a “fisher” whose livelihood depends on catching fish.
2. Peanut M&Ms represent the largest high value fish (tuna, swordfish, etc.) Plain M&Ms represent the medium value fish (cod, salmon, etc).
3. Each fisher must catch at least two fish in each round to survive (i.e., get enough fish to either eat or sell).
4. When the fishing begins, you must hold your hands behind your back and use the “fishing rod” (straw) to suck “fish” (M&Ms) from the “ocean” bowl and deposit them into their “boat” (cup).
5. The fish remaining in the ocean after each fishing season represent the breeding population, and thus one new fish will be added for every fish left in the ocean (bowl).

The class will be divided into groups. Each group must choose an ocean name such as North Atlantic, North Pacific, Arctic, Mediterranean, etc. Assign one person to get the fishing gear: one serving bowl for the group, and a cup, straw and fishing log per member.

Put 20 plain and 10 peanut M&Ms in your serving bowl.

When your teacher says “Start Fishing”, you will have 20 seconds for the first “season” of fishing.

Count your catch and record the data in your *Fishing Log*. If you did not catch the two fish minimum, you must sit out for the following round.

Before each new season, add one new fish for every fish left in the ocean (bowl).

p. 26 Repeat fishing, recording, and replenishing fish stocks until either sustainable fishing is achieved or until all (or most) groups fish out their ocean.

Fishing Log

Ocean name: _____ Fishers: _____

Record your group's catch and fish left in ocean after each season:

Season	Catch			Fish Left in the Ocean
	High Value Fish	Medium Value Fish	Total Catch	
1				
2				

Write a brief description of the status/health of your fishery:

Season	Catch			Fish Left in the Ocean
	High Value Fish	Medium Value Fish	Total Catch	
3				
4				

Discuss changes in fishing practices or regulations. Are any fisheries in trouble? What did they do and how did that impact your fishery?

Season	Catch			Fish Left in the Ocean
	High Value Fish	Medium Value Fish	Total Catch	
5				
6				

Write a brief description of the status or health or your fishery now:

How could you have made your fishing sustainable?

Ecosystems



We are all connected.

Climate change will affect where plants and animals can live. It will change where ecosystems can be located on this planet. For example, Newfoundland has a cool climate and particular animals and plants live here that have adapted to our climate. We have one of the biggest boreal forest ecosystems in the world. What do you think will happen if the climate were to change? More deciduous trees (like maple and willow) would come in and other species (like black spruce and balsam fir) would get pushed out. And if the trees change the animals will change too. Our entire forest would look different.

And not just the forest would change, the oceans would change too! The ocean is an important part of life here in Newfoundland and Labrador. And a warmer ocean would mean trouble for an already troubled fishery. Species would change. For example, the Atlantic Cod is a coldwater fish. As the ocean warms, the cod will move north to follow the cold water. And if the Cod moves north what will happen to the other species that depend on them? And Cod isn't the only coldwater fish. Most of the fish off Newfoundland are coldwater fish, so we could see big changes in what we find off our coasts. Every summer we get more reports of southern marine species being seen off our coasts. New species added to the ecosystem will cause changes that are hard to predict.

A closer look

The Canadian north is one of the most endangered places on the planet. Scientists predict that northern regions will warm more than other places. Snow and ice act like mirrors, they reflect a lot of the sun's heat. But, as the world gets warmer, a lot of snow and ice will melt. This means that darker land and open water will soak up more of the sun's heat. The results will change the way the north looks and the way the people there live. Consequences of climate change in the north could include the following:

1. *Melting permafrost*

The layer of permanently frozen ground (permafrost) will thaw, making the ground soft. Buildings, water lines and power poles could tilt and gradually break or fall as the ground thaws. Melting permafrost could also make it harder for migrating animals and hunters and gatherers to travel over soft, uneven ground.

2. *Less ice*

We all know that when you heat ice, it melts. People are already noticing earlier spring break-ups on rivers, lakes and even on parts of the Arctic Ocean. When ice and snow on land melt, water levels in lakes and rivers rise, sometimes causing floods. Sea ice is breaking up earlier, thinning out, and

covering less ocean surface during the summer months. More open water along the Arctic coast means more ocean waves lapping or crashing against the shore. When you add that to melting permafrost, coastlines can collapse.

3. *Animals on the move*

Warmer temperatures are making it easier for some southern species of plants and animals to survive farther and farther north. At the same time, some northern plants and animals are finding it harder to survive as their environment changes. For example, as cold-water areas warm and southern fish species move in, cold-water fish, such as cod, may have a harder time surviving. Animals such as moose are being seen further north as are plants such as willows.



Photo credit: Parks Canada, W. Lynch

A Closer Look: Ecosystem Change in the North



Photo Credit: Parks Canada, W. Lynch

Animal in peril – The Polar Bear

One of the many northern animals that are facing challenges is the polar bear. Polar bears are affected by what happens to ice and seals, their main food source. As the ice melts earlier in the spring, and the edge of the icepack gets farther away from land, polar bears have a harder time reaching the seals that they hunt for food. This has already happened in the Hudson Bay region. There, polar bears are having trouble reaching the seals they usually fatten up on in the spring. That's why scientists report lower weights and birth rates for polar bears that live there.

People in peril – forced to move

Changes in the northern ecosystem are affecting the lives of northern residents already. Continued changes are going to have negative impacts on northern communities. As animals, like the polar bear, move to new areas in the search for food they come into closer contact with people more often. This causes safety concerns for both people and animals. The changes in breeding and feeding patterns of some animals, including some fish and seals, will also affect the traditional hunting and trapping activities and impact the local industry.

Ecosystems Activities

Web of Life

Grade Level: 4 - 6

Fill in the blanks as you go along.

Either directly or indirectly, almost every animal in the ocean depends on phytoplankton for food as these tiny plants form the base of nearly every food chain in the ocean. Plants use energy from the sun to make their own food through photosynthesis. In turn, some animals eat plants, and other animals eat the plant-eating animals.

You will be one of the following links in the marine food chain:

Phytoplankton	Zooplankton
Icelandic scallop	Capelin
Atlantic cod	Offshore octopus
Blue shark	Harp seal
Humpback whale	Killer whale
Sun	

I am _____ and I depend on _____ to survive. An organism that depends on me is _____.

Follow the teacher's instructions on how to play the game. Remember that you depend on something else in the chain to survive. And that other things depend on you!

Eventually everything will be tied together in a big web. What happened when your teacher cut the web?

What happened to you when the string was cut?

Bearly Any Ice

Grade Level: 4 - 12

Data Chart

Year	# of Rounds in Year	# of Hula Hoops	# of Adult Polar Bears at Beginning of Round	# of Surviving Adult Polar Bears	# of Cubs at beginning of round	# of Surviving Cubs	# of Cubs Born	# of Seals at Beginning of Round	# of Seals at End of Round
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

Activity Directions

Polar bears are an important part of the northern ecosystem. But, this large carnivore depends on sea ice to get to their main food source – seals. What will happen to the bears as the ice melts due to climate change? Play this game to find out.

In this game, you will either be a polar bear or a ringed seal. Most of your class will be seals. Each seal is given 10 food tokens. When a bear catches a seal, they must give them one of their food tokens. The four hula-hoops represent areas of open water that are temporary safety zones for the seals.

Fill in the chart provided as you go. Each seal starts each round with 10 tokens. All students are in each round. Things change as each year passes. Listen to your teacher for the changes.

At the end of the game, look at your data and make conclusions as a class.

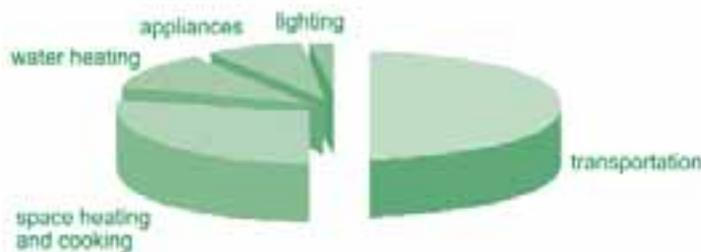
Getting There



Travel with friends and
reduce your emissions.
Carpool or walk!

How do you get around? Do you travel by car, ride your bike, walk, take the bus, or roller blade? There are lots of ways that you can get to where you want to go but some of them emit less CO₂ than others, which means that some modes of transportation are better for the environment than others.

Transportation accounts for about 50% of Canada's greenhouse gas emissions. And unless we change our ways and reverse some current transportation trends, that number will only get higher.



Personal GHG emissions from energy use

Some current transportation trends:

Canadian vehicle ownership is now double what it was in 1960.

The number of kilometres driven is now double what it was in 1960.

At the same time, freight has shifted from fuel-efficient rail to gas-guzzling trucks.

What do you think is the single biggest contributor to greenhouse gas emissions for transportation? It's not the transport truck, but the passenger vehicle – cars and light duty trucks.

Gas guzzling sport utility vehicles (SUVs) and mini vans account for around 50% of all new vehicles sold. These vehicles have a negative impact on average fuel efficiency, as do most cars on the road today. Read on to discover some things that you can do to help.

A closer look

Fossil fuel products, like gasoline and diesel, power most of the vehicles in Canada. And we know that burning fossil fuels creates greenhouse gases, which in turn enhances the greenhouse effect. So, what are we to do? The only fuel available is from fossil fuels, right?

Nope! There are alternatives to using gas-powered vehicles. Some of these alternative fuels are more popular than others and all have their strengths and weaknesses when it comes to getting us around. Biodiesel, electricity, ethanol, hydrogen, natural gas, and propane have all been suggested as viable alternatives to gasoline vehicles.

One alternative you may have heard about is the hybrid. A hybrid is any vehicle that runs on more than one source of power. Many train engines and buses now run on diesel and electricity – making them hybrids. The Toyota Prius and cars like it are gasoline-electric, meaning that they are a cross between a gas car and an electric one. It is more fuel-efficient than a gas powered vehicle and does not emit as much CO₂. But right now a hybrid is only better for city driving. It actually burns more fuel than a traditional vehicle on the highway.



Pedal power is a clean way to get around. And good for you too!

So what can I do?

You have to get around, go to school, work or to the store. There are some simple things you can do (or ask your family to do) to reduce greenhouse gas emissions from transportation, such as:

Turn off your car

If you are going to be stopped for more than 10 seconds, turn your engine off (except in traffic). Idling your vehicle for more than 10 seconds uses more fuel than it would take to restart your engine.

Drive at the posted speed limit

With most vehicles, increasing your cruising speed from 100 kilometres per hour to 120 kilometres per hour will increase fuel consumption by about 20%. Speeding also reduces the life of your tires. On the highway, use cruise control to maintain a steady speed and reduce fuel consumption.

Keep your vehicle well maintained

A poorly maintained engine can use up to 50% more fuel and produce 50% more CO₂ than one that runs properly. Neglecting to replace worn-out oil and filters results in poor engine performance, higher fuel consumption and, possibly, severe engine damage.

Car pool or use public transportation

If your community has a bus system, use it. While still creating emissions, there is less than if everybody travelled separately. You can also organize a car pool to school, sporting events, and other activities. Better to only emit from one vehicle as opposed to three.

Use alternative transportation

There are lots of emission free ways to get around that are not only good for the environment, but your body too. Some of these are biking, roller blading, skateboarding, walking, or running.



Taking the bus reduces your greenhouse gas emissions.

Turn Off Your Engines

Grade Level: 4 - 8

Transportation accounts for 50% of our personal emissions of greenhouse gases. And idling is a big part of that. We all need to put a stop to engine idling. Idling for more than 10 seconds, except in traffic, wastes money and causes damage to the environment.

Some idling facts:

1. Canadian motorists idle their vehicles an average of five to 10 minutes per day. A recent study suggests that in the middle of winter, Canadians idle their vehicles for a combined total of more than 75 million minutes a day – equal to one vehicle idling for 144 years!
2. In Canada, if we all reduced our idling by just “five” minutes every day – we could prevent more than two million tonnes of carbon dioxide from entering the atmosphere each year!! That’s the same as taking 350,000 cars off the road!
3. Idling is a habit that is costing us millions of dollars a year in wasted fuel and producing unnecessary emissions of carbon dioxide.
4. Vehicle idling also contributes to other environmental problems such as deteriorating air quality and smog, which directly affects the health of children and other vulnerable members of our community, including seniors and people with respiratory problems.

Learn more by doing the Idling Quiz. Use your new knowledge to help people stop idling.

Part 1: Idling Quiz – mark each as True or False.

- | | |
|--|----------|
| 1. Idling uses more fuel than shutting off your passenger car or light duty truck and restarting it. | 1. _____ |
| 2. Prolonged idling reduces the operating life of a vehicle’s engine | 2. _____ |
| 3. You should warm up your engine before driving your passenger car. | 3. _____ |
| 4. If you spend five minutes idling each day, it can cost you an average of \$38 a year in fuel. | 4. _____ |
| 5. For every litre of gasoline burned, 2.4 kg of carbon dioxide enters our atmosphere. | 5. _____ |
| 6. Vehicle emissions contribute to health problems. | 6. _____ |

Are you emissions aware? What was your score? _____

(Turn the page for *Part 2*)

Part 2: How much idling do you see?

For the next few weeks, be aware of idling vehicles and record information for each one you see. At the end of each week, record your data on the Idling Data Chart.

Once you have your data, calculate the amount of GHG emissions released into the atmosphere by using the information provided and following your teacher's instructions.

Now that you understand how idling contributes to climate change, consider creating an anti-idling campaign to reduce the amount of idling that happens in your community.

Car Quest

Grade Level: 7 - 12

What kind of car do you want to own? SUV? Truck? Subcompact? Every car has an effect on the environment. In fact, vehicles are the biggest CO₂ emitters around. In this activity you are going to look at the environmental impact of a fleet of vehicles. You'll look at how much CO₂ they produce, how much fuel they use, and so on. Let's see if your dream car now is the same as your dream car after you finish this activity.

Follow any instructions given by your teacher. Fill in the activity as you go along.

Part 1

My dream car is _____ because _____

Remember to take note of the details when you're in the parking lot. Record the make, model, type, and, if possible, year of the vehicles in the section you are assigned. Fill in the first three columns of the *Vehicle Environmental Impact Survey* given out by your teacher.

Once back in the class, use the Internet to find the environmental impact of the vehicles and complete the rest of the chart. Note that if you don't know the transmission type, use the automatic information and that if you didn't know the engine size, use the information for the smallest engine (usually a V-4 or V-6).

Here's some good websites for information on Fuel Economy, and there are lots more that you can find and use:

1. *Fuel Consumption Guide 2005*: <http://oee.nrcan.gc.ca/transportation/tools/fuel-consumption-guide/fuel-consumption-guide.cfm?attr=8>
2. *U.S. Department of Energy*: www.fueleconomy.gov
3. *U.S. National Highway Traffic Safety Administration – Buying a Safer Car*: www.nhtsa.dot.gov/NCAP

Gather the class data into one large chart. Review the chart. What do you see?

Part 2

Four cleaner transportation options are hybrid cars, alternative fuels, better fuel efficiency, and non-car transportation.

Investigate the alternate assigned to you and present your findings to your class. After each group has presented, discuss the pros and cons of that particular approach to reducing greenhouse gas and other pollutant emissions.

How effective is it?

How expensive is it?

How feasible is it?

Does it seem like a reasonable option for most people?

After this exercise, has your idea of a dream car changed?

Now my dream car is _____ because _____

Barriers to Change

Grade Level: 7 - 12

There are many myths about vehicle idling, the effects of idling on climate change, and the logic of social marketing (marketing toward behaviour change with information and positive reinforcement). Idling is contributing to climate change and you have the power to change people's behaviour. The best place to start is in the school parking lot.

Listen to the instruction from your teacher and participate in any discussions.

In groups, brainstorm the reasons for and against idling. Why do you think people leave their vehicles running or why they turn them off? Is idling necessary?

Read *Letter from Ford Motor Company* and *The Truth about Vehicle Exhaust* (both will be handed out). Make notes as you read.

Discuss the information in the handout and answer the following questions:

1. Has this information changed your opinions about vehicle idling? Why or why not?
2. Are there any arguments you feel haven't been addressed? If yes, what are they?

Social marketing: Behaviour change can be initiated in a community once the barriers to the desired behaviour have been identified and addressed. In the case of vehicle idling, the barriers to the desired behaviour (turning off vehicles) are the misconceptions (better for my engine, etc). The emphasis of social marketing is direct contact with community members and removing barriers.

Come up with a plan to apply the concept of social marketing to the issue of vehicle idling. This will require your class to create an anti-idling campaign, which involves educating people about the facts of vehicle idling and having direct contact with the community.

Your goal is to reduce idling in the school's parking lots and student drop-off zones.

Tips for Getting Your Campaign Heard:

Posters

Information Pamphlets

Presentations to council, school officials, community groups or other youth

Letters to editors of local newspapers

Articles in school newspapers



Carpooling is a great way to reduce the number of the cars on the road, and reduce your greenhouse gas emissions. And it's always more fun to travel with friends!

Get Involved!



Help clean up your community to make it a greener place!

There are lots of ways that you or your family or your class can help the planet. Some were listed throughout this book and here are just a few more:

The One-Tonne Challenge

The One-Tonne Challenge asks you to reduce your annual greenhouse gas emissions by one tonne, or 1000 kilograms. The average Canadian produces approximately five tonnes of greenhouse gas emissions each year so one tonne is a reduction of about 20%. Every time you drive a car, take out the garbage, or do anything else that uses energy from fossil fuels you contribute to greenhouse gas emissions (GHGs) that cause climate change.

Getting started is easier than you think! It's as simple as making a personal commitment to use energy and resources more efficiently in your daily life to reduce your emissions.

By using energy more efficiently in your daily activities, you'll not only reduce GHG emissions but your efforts will give us cleaner air and healthier communities. Many Newfoundlanders and Labradorians already protect the environment through recycling, reducing, re-using and composting. Now it's time to take the next step to slow climate change! It's time to sign up for the One-Tonne Challenge!

For more information on how you can take the challenge, visit their website at www.climatechange.gc.ca.

There are lots of other ways you can help, here's some suggestions from the Club:

Climate Change Club Top Ten:

- Turn things off
- Spend more time outside
- Be an energy detective
- Eat a meat free meal once a week
- Choose local food
- Have a litter-free lunch day
- Encourage people to drive smarter
- Use your own power to get around
- Express yourself
- Share information with other people